

ment of our version of MUSE decoders. We have considerable engineering expertise in the area of bandwidth compression and signal multiplexing techniques. We are also familiar with attendant issues such as motion artifacts relating to frame conversion and with the contemporary methodologies to alleviate such artifacts. Given this background, we have some specific comments in response to the questions posed by the Commission in paragraph 40 of the NOI and comments filed by interested parties in response thereto.

The proposed 1125/60 studio origination standard starts with three wideband component RGB video signals, each with a bandwidth in the neighborhood of 30 MHz. This represents an enormous amount of real picture information. This is, however, the amount of information needed to adequately present to the viewer the full benefits of an HDTV picture. This is also the amount of information required to accomplish a quality transfer to 35mm film and to properly implement many high-tech closed circuit electronic imaging systems, such as printing/publishing. Indeed, some purists would argue that even more information is needed.

To squeeze such an HDTV signal (or, more appropriately, an adequate representation of such a signal) through the single 6 MHz channel currently allocated to the terrestrial broadcaster in the United States calls for the finest in state of the art bandwidth compression techniques. All of

our considerable expertise tells us that any of the contemporary techniques suggested cannot result in a transmitted signal that qualifies as a true HDTV signal.* We do not believe this is possible today within the constraints of 6 MHz. Nor do we see a technological evolution that holds promise to accomplish this within the foreseeable future. Our own conclusion, therefore, is that a single 6 MHz channel can only deliver some form of EDTV signal to the home viewer.

This conclusion immediately raises the question as to what channel bandwidth is required to deliver a minimum, but valid HDTV picture representation to the home viewer. We are quite confident that the addition of a second channel makes all the difference. A single contiguous 12 MHz channel would transport a quite high quality HDTV picture portrayal. Residual artifacts and compromises would, we believe, be invisible to the untrained home viewer.

Is a full additional 6 MHz required, however? There is reasonable evidence in our view, in these early days, to suggest that something less would be more than adequate. A number of today's proposals for ATV transmission hold high promise. Our own involvement with the MUSE system convinces us that 8.1 MHz will transport an impressive HDTV picture.

* We use here the generally accepted criterion that an HDTV signal must present to the viewer at least twice the horizontal and vertical resolution of the existing TV system.

We do, however, draw the attention of the Commission to the somewhat ill-defined criteria which exist for what we term "consumer" or "home-viewer" picture portrayal as opposed to full "studio" quality pictures. We all know such a distinction exists within today's broadcast television environment. We are very sure such a distinction will exist for tomorrow's ATV systems. A better definition of the "consumer" quality picture, however, would aid considerably the final tailoring of any proposed ATV transmission scheme. We bring this key point to the Commission's attention in light of the considerable debate which centers on the MUSE transmission system today. Most of those making comments on the qualities of MUSE, and indeed on the quality of the other embryonic system proposals, are television studio experts. We tend to debate while wearing our "studio" hats. While perhaps inevitable, this perspective is ultimately not very constructive in solving the dilemma of the terrestrial broadcaster.

Terrestrial transmission must involve compromises. We urge the Commission to pay particular attention to this key point. We believe evaluations of all proponent systems must embrace consumer receiver experts, psychophysical experts, and extensive subjective testing using lay people. We also submit that MUSE, controversial though it currently may be within the United States, does represent a valid system based on a careful analysis of the trade-offs between high engineering criteria, real transmission constraints, and

psychophysical guidance on home viewing picture quality. MUSE has been brought closer to completion than any other system at this time. For this reason alone, it should serve, at the very least, as a yardstick against which all other work should be measured.

VI. THE 1125/60 ISSUE: IS IT UNFRIENDLY TO A UNITED STATES
ATV TRANSMISSION SYSTEM?

There has been considerable debate over whether the 1125/60 system is unfriendly to other ATV systems under consideration in the United States. The answer is a very firm "no." This response is based less on our well known affection for the 1125/60 system than on our technical familiarity with the reality of ATV transmission schemes. All ATV transmission systems will involve complex conversion from a studio standard to the unique encoding scheme required to formulate the special signals that realistically can be transmitted over existing channels. Whether such a conversion is from 1050 lines, 1125 lines, 1250 lines, or any other number of lines is technically irrelevant. The complexity of such line conversion pales in comparison to the overall complexity of any of the proposed transmission encoding schemes (such as HD-MAC, HD-NTSC, ACTV, etc.)

It is far too simplistic to race to the seemingly obvious conclusion that 1050 (2 times our familiar 525) is

automatically "friendly" to any ATV transmission system. Much more is involved. The technical parameters of the studio production standard must be viewed from a more all-embracing stance. The product of this examination will be the master electronic origination signal; it must therefore lend itself to a wide variety of conversions, including conversion to all 525 studio systems; conversion to all 625 studio systems; conversion to 35mm film; conversion to ATV terrestrial transmission systems; conversion to ATV DBS transmission systems; conversion to ATV cable transmission systems; conversion to ATV professional video distribution/video disc; and conversion to ATV consumer VCR/video disc.

VII. THE SINGLE WORLDWIDE STANDARD: A VANISHED DREAM?

At the May 1986 International meeting of the CCIR, the momentum which had been growing in support of the 1125/60 as a single worldwide standard for studio origination and international program exchange was curtailed. A vigorous resistance arose among some European entities. This resistance has since developed into an active pan-European effort known as Project Eureka which seeks to develop an HDTV studio origination standard based on 1250/50. As a result, it appears that the possibility of the 1125/60 system regaining sufficient international support at the next CCIR meeting (May 1989) is now considerably impaired.

Sony shares the disappointment of many at this turn of events.* We participated in a very major way in the technical developments to perfect standards converters dealing with the difficult 60/50 frame rate conversion issue to convince Europe that modern technology had much to offer in making a single standard truly viable. We can report with confidence that the technical quality of downconversion from 1125/60 to both 525/59.94 and to 625/50 is of a very high performance level.

However, we have since adopted a pragmatic optimism based upon a sober assessment of today's reality. We do not think the dream of a single worldwide studio origination standard has vanished. We strongly believe that the United States can yet emerge in a leadership role that will aid many countries to make a final choice within CCIR that admittedly is not simple.

We base this optimism on a number of factors. First, and most important, since the events of May 1986, SMPTE and ATSC have continued their high level of work in the United States. These organizations produced a very complete and detailed draft standard based on 1125/60. Of special

* In 1983 the nine major broadcasting unions of the world met in Algiers and voted unanimously to strive for a single world-wide HDTV standard for studio origination and international program exchange. The unions still endorse this goal while conceding that it may today appear difficult to attain.

significance, all of the contributing manufacturers accepted the many detailed alterations generated within SMPTE that were mandated by the desire for a single definition of many parameters. Even at draft level, this proposed standard serves today as a concise blueprint for new 1125/60 equipment designs, many of which will appear in the marketplace in 1988. Second and third generation cameras, switchers, VTRs, etc., will emerge during the next year adhering to the proposed new standard. Actual working hardware, tempered by four years of real program production in HDTV, is proliferating. The intense, unified work of SMPTE, ATSC and BTA, while not yet complete from the viewpoint of the formal standards, nevertheless serves as a major spur to the advance of the 1125/60 system. It is today a very firm reality. We view this as highly encouraging.

The international interests of program producers in the United States have been carefully protected. Work proceeds within Sony and elsewhere to perfect an 1125/60 to 625/50 standards converter so that HDTV programs produced in the United States can be released (with high quality) within the 625/50 countries in years to come. This will be true even if Project Eureka successfully implements a European 1250/50 HDTV system. Programs originating in the United States will still be capable of distribution within those European countries, with a picture quality indistinguishable from anything produced by the best of European origination.

The existence of such a standards converter will not be lost upon the Europeans. Many experts, within both the European broadcast community and their general program production communities, view Project Eureka with hope, but also with some concern. While paper design proceeds vigorously and enthusiastically, and some early prototype equipment will undoubtedly emerge, there still remains the real practicality to be confronted, namely, detailed standards, firmly agreed to by all participating European manufacturers. This must be followed by a cohesive 1250/50 HDTV product implementation from all of these same primary European manufacturers. It took many years for a full 1125/60 system to emerge with real functioning and available hardware. This, however, is now firmly in place.


Also of significant concern to European program producers is whether North Americans will accept programs originated on a 50 Hz system at a time when we have become very familiar with the very high quality of our own 1125/60 system. Many within Europe view this situation with real apprehension and look longingly to the United States, Canada, and Japan, where they see not only an established unison on a standard but a growing volume of real hardware, in actual program production, that is years ahead of their own prototypes.

Sony believes that the maintenance of a strong unified North American position regarding the now highly refined 1125/60 studio production standard will serve as an irresistible magnet in 1989* to many countries who understandably waver as they attempt to assess the true status of a 1250/50 system. We strongly recommend a continuing close liaison with the European broadcasters and program producers. To date, the issues have been faced much more squarely, and on a far broader basis, in the United States. We have learned much about ATV. Yet much remains to be solved. The sharing of all of our experiences with the European countries will continue an important international process.

* In early 1989, there is planned an extraordinary session of CCIR Study Group 11 to review the international status of HDTV issues.

Respectfully submitted,

SONY CORPORATION

By: 
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January 19, 1988

CERTIFICATE OF SERVICE

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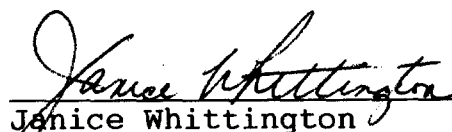
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